

WE CLAIM:

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A room-temperature liquid stable prepolymer (P) which is the reaction product of

a) methylene diphenylisocyanate or a prepolymer of methylene diphenylisocyanate and an about 500-1000 equivalent weight polytetramethylene ether glycol or polyoxypropylene/polyoxyethylene diol or triol having at least 21% residual NCO,

b) polytetramethylene ether glycol of about 500 to 1000 equivalent weight, and

c) a polyoxypropylene/polyoxyethylene triol or polyoxypropylene triol of about 1300 to 2000 equivalent weight,

the percentage by weight in the prepolymer (P) being about 32 to 72% of (a), about 52 to 22% of (b), and about 6 to 15% of (c), and the percentage of residual NCO in the prepolymer (P) being about 6 to 18% by weight,

the prepolymer (P) having a viscosity at room temperature of about 1200 to 26000 cps,

which prepolymer (P) is curable and castable at room temperature to yield a high-performance urethane elastomer.

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The prepolymer(P) of Claim 1 wherein the percentage of residual NCO in the prepolymer(P) is about 11.5-13.5%

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The prepolymer (P) of Claim 1 wherein a) is methylene diphenylisocyanate.

The prepolymer (P) of Claim 1 wherein c) is a polyoxypropylene/polyoxyethylene triol having an equivalent weight of about 1300 to 2000 or a polyoxypropylene triol having an equivalent weight of about 1300 to 2000.

The prepolymer (P) of Claim 1 wherein (a) is a liquid uretonimine-modified methylene diphenylisocyanate.

The prepolymer (P) of Claim 1 wherein b) has an equivalent weight of about 500.

The prepolymer (P) of Claim 1 wherein b) has an equivalent weight of about 1000.

The prepolymer (P) of Claim 1 wherein a) is a previously-prepared reaction product of methylene diphenylisocyanate and polytetramethylene ether glycol having an equivalent weight of about 500 to 1000.

The prepolymer (P) of Claim 1 wherein a) is a previously-prepared reaction product of methylene diphenylisocyanate and a polyoxypropylene/polyoxyethylene diol having an equivalent weight of about 500 to 1000.

The prepolymer (P) of Claim 1 which is curable at room temperature with an approximately stoichiometric equivalent of a liquid curative consisting essentially of the following components:

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(1) a polyoxypropylene/-polyoxyethylene diol of about 1000 to 2000 equivalent weight, (2) a polyoxypropylene/-polyoxyethylene triol of about 1300 to 2000 equivalent weight, (3) a chain extender having an equivalent weight of about 25 to 125, (4) a room-temperature liquid stable prepolymer (P) having a 6 to 18% residual NCO, (5) a diluent, (6) a degassing aid, and (7) a urethane catalyst, the relative amounts by weight being respectively 30 - 90%, 3 - 20%, 5 - 30%, 0 - 30%, 0 - 15%, 0.001 - 0.05%, and 0.01 - 0.5%.

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The prepolymer (P) of Claim 1 which is cured at room temperature with an approximately stoichiometric equivalent of a liquid curative consisting essentially of the following components:

(1) a polyoxypropylene/-polyoxyethylene diol of about 1000 to 2000 equivalent weight, (2) a polyoxypropylene/-polyoxyethylene triol of about 1300 to 2000 equivalent weight, (3) a chain extender having an equivalent weight of about 25 to 125, (4) a room-temperature liquid stable prepolymer (P) having a 6 to 18% residual NCO, (5) a diluent, (6) a degassing aid, and (7) a urethane catalyst, the relative amounts by weight being respectively 30 - 90%, 3 - 20%, 5 - 30%, 0 - 30%, 0 - 15%, 0.001 - 0.05%, and 0.01 - 0.5%.

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The cured prepolymer of Claim 11 wherein the amounts of (4) and (5) in the curative are respectively 10-20 and 5-15% by weight.

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The prepolymer (P) of Claim 1 which is curable at room temperature with an approximately stoichiometric equivalent of a liquid curative consisting essentially of the following components:

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(1) a polyoxypropylene/-polyoxyethylene diol of about 1000 to 2000 equivalent weight, (2) a polyoxypropylene/-polyoxyethylene triol of about 1300 to 2000 equivalent weight, (3) a chain extender having an equivalent weight of about 25 to 125, (4) a room-temperature liquid stable prepolymer (P) having a 6 to 18% residual NCO, (5) a diluent, (6) a degassing aid, and (7) a urethane catalyst, the relative amounts by weight being respectively 30 - 90%, 3 - 20%, 5 - 30%, 0 - 30%, 0 - 15%, 0.001 - 0.05%, and 0.01 - 0.5% to give a cured urethane elastomer having the following properties after mixing and curing for seven days at room temperature:

Tensile strength (ASTM Method D-412)	about 1300-2700 psi
Elongation (ASTM Method D-412)	about 250-700%
Die C Tear (ASTM Method D-695)	about 140-400 pli
Split Tear (ASTM Method D-1938)	about 20-100 pli
Rebound (ASTM Method D-2632)	about 45-65%
Shore A Hardness (ASTM Method D-2240)	about 70-95
Gel time (25°C)	about 14-40 min..

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The prepolymer (P) of Claim 2 which is cured at room temperature with an approximately stoichiometric equivalent of a liquid curative consisting essentially of the following components:

(1) a polyoxypropylene/-polyoxyethylene diol of about 1000 to 2000 equivalent weight, (2) a polyoxypropylene/-polyoxyethylene triol of about 1300 to 2000 equivalent weight, (3) a chain extender having an equivalent weight of about 25 to 125, (4) a room-temperature liquid stable prepolymer (P) having a 6 to 18% residual NCO, (5) a diluent, (6) a degassing aid, and (7) a urethane catalyst, the relative amounts by weight being respectively 30 - 90%, 3 - 20%, 5 - 30%, 0 - 30%, 0 - 15%, 0.001 - 0.05%, and 0.01 - 0.5% and a room-temperature viscosity of about 300-50000 cps, to give a cured urethane elastomer having the following properties

after mixing and curing for seven days at room temperature:

Tensile strength (ASTM Method D-412)	about 1300-2700 psi
Elongation (ASTM Method D-412)	about 250-700%
Die C Tear (ASTM Method D-695)	about 140-400 pli
Split Tear (ASTM Method D-1938)	about 20-100 pli
Rebound (ASTM Method D-2632)	about 45-65%
Shore A Hardness (ASTM Method D-2240)	about 70-95
Gel time (25°C)	about 14-40 min..

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The cured prepolymer of Claim 14 wherein the amounts of (4) and (5) in the curative are respectively 10-20 and 5-15% by weight.

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The cured product of Claim 14 wherein the prepolymer (P) is present in an up to about 13% stoichiometric excess with respect to the curative.

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The cured product of Claim 16 wherein the prepolymer (P) is present in about a 2 to 7% stoichiometric excess with respect to the curative.

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The prepolymer (P) of Claim 2 wherein the percentages by weight of a), b), and c) are respectively about 54%, about 36%, and about 10%.

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The prepolymer (P) of Claim 18 cured with an approximately stoichiometric equivalent of a curative consisting essentially of (1) a polyoxypropylene/-polyoxyethylene diol of about 1000 to 2000 equivalent weight, (2) a polyoxypropylene/-polyoxyethylene triol of about 1300 to 2000 equivalent weight, (3) a chain extender having an equivalent weight of about 25 to 125, (4) a room-temperature liquid stable prepolymer (P) having a 11.5 to 13.5% residual NCO, (5) a diluent, (6) a degassing aid, and (7) a urethane catalyst, the relative amounts by weight being respectively approximately 54%, 13%, 10%, 15%, 8%, 0.005% and 0.006%.

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The cured prepolymer (P) of Claim 19 wherein the curative has a viscosity at room temperature of about 3000-5000 cps and a specific gravity of about 1.05-1.08.

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The cured product of Claim 20 wherein the prepolymer (P) is present in an up to about 13% stoichiometric excess with respect to the curative.

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The cured product of Claim 21 the prepolymer (P) is present in about a 2 to 7% stoichiometric excess with respect to the curative.

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The cured prepolymer (P) of Claim 22 wherein the properties after mixing and curing for seven days at room temperature are as follows:

Tensile strength (ASTM Method D-412)	about 1550psi
Elongation (ASTM Method D-412)	about 500%
Die C Tear (ASTM Method D-695)	about 250 pli
Split Tear (ASTM Method D-1938)	about 45 pli
Rebound (ASTM Method D-2632)	about 55%
Shore A Hardness (ASTM Method D-2240)	about 80
Gel time (25°C)	about 20-30 min..

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The cured prepolymer (P) of Claim 23 wherein the degassing aid is a silicone emulsion.

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The cured prepolymer (P) of Claim 23 wherein the catalyst is a mixture of triethylene diamine and 2,3-dimethyltetrahydropyrimidine or bismuth neodecanoate.

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The cured prepolymer (P) of Claim 23 wherein the degassing aid is a silicone emulsion and the catalyst is a mixture of triethylene diamine and 2,3-dimethyltetrahydropyrimidine or bismuth neodecanoate.

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A kit comprising the separately packaged prepolymer (P) of Claim 1, and a separately packaged curative consisting essentially of (1) a polyoxypropylene/-polyoxyethylene diol of about 1000 to 2000 equivalent weight, (2) a polyoxypropylene/-polyoxyethylene triol of about 1300 to 2000 equivalent weight, (3) a chain extender having an equivalent weight of about 25 to 125, (4) a room-temperature liquid stable prepolymer (P) having a 6 to 18% residual NCO, (5) a diluent, (6) a degassing aid, and (7) a urethane catalyst, the relative amounts by weight being respectively 30 - 90%, 3 - 20%, 5 - 30%, 0 - 30%, 0 - 15%, 0.001 - 0.05%, and 0.01 - 0.5%.

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The kit of Claim 27 wherein the curative has a viscosity at room temperature of about 300-50000 cps and a specific gravity of about 1.02-1.15.

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A kit comprising the separately packaged prepolymer (P) of Claim 2, and a separately packaged curative consisting essentially of (1) a polyoxypropylene/-polyoxyethylene diol of about 1000 to 2000 equivalent weight, (2) a polyoxypropylene/-polyoxyethylene triol of about 1300 to 2000 equivalent weight, (3) a chain extender having an equivalent weight of about 25 to 125, (4) a room-temperature liquid stable prepolymer (P) having a 6 to 18% residual NCO, (5) a diluent, (6) a degassing aid, and (7) a urethane catalyst, the relative amounts by weight being respectively 30 - 90%, 3 - 20%, 5 - 30%, 0 - 30%, 0 - 15%, 0.001 - 0.05%, and 0.01 - 0.5% and a room-temperature viscosity of about 300-50000 cps.

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The kit of Claim 29 wherein the amounts of (4) and (5) in the curative are respectively 10-20 and 5-15% by weight.

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The kit of Claim 29 wherein the curative consists essentially of the stated components in the following approximate percentages: 54%, 13%, 10%, 15%, 8%, .005%, and 0.006% and has a viscosity at room temperature of about 3000 to 5000 cps and a specific gravity of about 1.05 - 1.08.

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The kit of Claim 31 wherein the percentages by weight of a), b), and c) in the prepolymer are respectively about 54%, about 36%, and about 10%.

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The kit of Claim 31 wherein the degassing aid in the curative is a silicone emulsion and the catalyst is a mixture of triethylene diamine and 2,3-dimethyltetrahydropyrimidine or bismuth neodecanoate.